





## From sewage sludge to fertilizer

Sources: N.E. Fertilizer Co., The Patriot Ledger, The Boston Globe.

After thickening agents have been added, the liquid sludge is filtered and pressed to remove about 90 percent of the water. Wide fabric belts squeeze the sludge and convert it into sheets called sludge cake, which is roughly 25 percent solids and 75 percent water.

After dewatering, the sludge may be treated with potassium permanganate to neutralize odors. The sludge then travels by conveyor belt to the drying ovens. Operated at 720 degrees Fahrenheit, the rotating ovens retain the sludge for about 30 minutes, simultaneously drying the sludge and forming it into pellets about one-eighth inch in diameter. The high heat of the ovens kills bacteria and pathogens and makes the sludge safe for reuse.

Pneumatic tubes convey the pellets into five 700-ton silos, where the product is stored until it can be loaded onto railroad cars for transport to markets.

## The product

The MWRA has a four-year contract with New England Fertilizer Co. of Boston to operate the plant and market the pellets. The fertilizer is sold or blended with other soil nutrients to form a product tailored to the specific needs of buyers. Sales of the pellets help to offset operating costs.

The MWRA hopes initially to produce 12,000 dry tons of the BB-sized fertilizer pellets each year. Production could increase to 60,000 dry tons annually when the processing plant begins to accept sludge from the new secondary wastewater-treatment plant at Deer Island starting in October 1996.

## The Walpole landfill

In 1990 the Massachusetts Legislature approved legislation giving the MWRA 94 acres of land in Walpole for a landfill for debris (called grit and screenings) screened from sewage. The landfill will also satisfy state and federal environmental requirements for a backup disposal site for sludge. The landfill would be used in the event that the sludge-processing plant in Quincy fails or the Authority is unable to market the fertilizer pellets.

The landfill has been designed to protect against groundwater contamination. The construction, which is expected to begin in 1993, includes a double composite liner, a leak-detection and leachate-collection system and groundwater-monitoring wells. Depending on whether the landfill is needed for emergency use, it could have an active life of 25 to 68 years beginning in March 1994 when it is scheduled to open. After 25 years of normal operations, the grit and screenings will take up less than a third of the landfill's capacity. After closure, the landfill will be covered with earth and planted with grass.

## Benefits to the harbor

Stopping sludge discharges has substantially lessened the amount of sewage solids accumulating in the harbor. The end of sludge dumping, along with other improvements such as increased pumping capacity at the Deer Island treatment plant and more efficient disinfection of wastewater, have already resulted in demonstrably cleaner waters.

Some changes in the harbor are already visible — a dense black plume of sludge is no longer being discharged into President Roads, and the smell, appearance and clarity of harbor waters has improved dramatically. In addition, recent monitoring results indicate a sharp decrease in fecal coliform levels near the old sludge discharge site.

Within a year of the last sludge discharge in the harbor, rocky areas near the old sludge outfalls are expected to recover, thus permitting characteristic New England species such as kelp, sea urchins, mussels and anemones to flourish.

Other important improvements in water quality will take years to be fully realized. As levels of organic material and toxic chemicals on the sea bottom decrease, more species, including small worms, clams and snails will begin to develop into communities typical among healthy soft-bottom marine environments.

The health of flounder and other fish and animals living in the harbor is also expected to improve. (The fish have been exposed to toxic chemicals through direct contact with contaminated sediments and by eating contaminated organisms.)

## Sludge in agriculture

Research programs conducted in almost every state have confirmed what centuries of organic tillage of croplands around the world had already demonstrated: wastewater sludge when properly applied and monitored is safe and practical for beneficial reuse in agriculture. Sludge has been used as commercial fertilizer for more than 60 years in the United States. MWRA sludge pellets qualify for agricultural use as a Type I sludge, the highest rating possible. MWRA sludge also compares favorably with commercial fertilizers.

- MWRA sludge meets state and federal standards for unrestricted use by the public on lawns, plants and gardens. It also meets all state and federal standards for use in agriculture, except pasture in Massachusetts.

- MWRA sludge can be used to fertilize food crops in Massachusetts. Under Department of Environmental Protection regulations that became effective in September 1992, Massachusetts farmers can use pellets made from MWRA sewage sludge as fertilizer in agriculture, except for pasture. MWRA sludge contains 11-12 parts per million (ppm) of molybdenum, slightly above the Massachusetts standard (10 ppm) for application of sludge to pasture.

- Metals are not toxic at the levels found in MWRA sludge. Two of the regulated metals, cop-

per and zinc, are micronutrients required by plants and animals for healthy growth. Many chemical and organic commercial fertilizers commonly used in agriculture are actually higher than MWRA pellets in metals such as cadmium, chromium, nickel and zinc.

- The Massachusetts Department of Environmental Protection recently raised the allowable limit of cadmium in sludge products used for fertilizer. The DEP determined that allowing higher concentrations of cadmium would have no effect on the safety of food crops. The cadmium limit in Massachusetts was previously 2 ppm, compared to 4 to 30 ppm in other states. Massachusetts' new standard is 14 ppm. New federal standards are expected to be 20-50 ppm. MWRA pellets contain less than 7 ppm. When applied as fertilizer, MWRA sludge will contribute only 1/16 oz. of cadmium per acre.

- MWRA pellets meet all requirements for unrestricted distribution and marketing in Florida, a prime market for MWRA sludge. The Florida Department of Environmental Regulation regulates the use of sludge products within the state and requires regular reports on sludge quality. Sludge pellets represent only a very small amount of the total fertilizer used in Florida, estimated at approximately 2 million tons each year. The MWRA will produce approximately 11,000 tons of pellets this year, half of 1 percent of the total Florida fertilizer market.

